UNITED STATES DEPARTMENT OF AGRICULTURE

Forest Service

Northeastern Area

Evaluation of Browntail Moth Populations on Cape Cod National Seashore in 1995

Biological Evaluation

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INTRODUCTION

The browntail moth, *Euproctis chrysorrhoea*, L., is an insect introduced from Europe. It was first found in Somerville, Massachusetts in 1896. After its introduction the moth spread until its range covered most of New England into parts of New York and Canada. This range reached its maximum in about 1914. Since that time the populations declined regionally until, by about the late 1960's browntail moth populations were found only on the outer dunes of Cape Cod National Seashore and islands in Casco Bay, Maine. The reasons for the decline in populations remains a mystery.

The browntail moth is a concern on Cape Cod for a number of reasons. First, populations have been heaviest in the past on shrub vegetation on the outer dunes. This vegetation is an important factor in stabilizing these dunes and high levels of shrub mortality could cause destabilization. Second, the larvae and pupae are covered with urticating hairs that can cause a severe rash to humans who are allergic to them. Third, because the browntail moth is a non-native insect, the National Seashore has concerns about it displacing native species, some of which are considered rare in the state of Massachusetts. Finally, in the last 2 or 3 years there has been an expansion in range of the browntail moth population in Casco Bay.

This evaluation reports the preliminary results of a survey done on Cape Cod in March of 1995. The objectives of the survey were to determine density of browntail moths in areas of known infestation and to set up a plot network to monitor any possible expansion of populations in coming years.

BROWNTAIL MOTH LIFE HISTORY/MANAGEMENT ACTIONS ON CAPE COD

Browntail moth eggs are laid in masses on the underside of leaves on host plants in late July to early August. The eggs hatch in about 3 weeks and the larvae feed gregariously, skeletonizing leaves. The larvae form a pre-web which is used when they are resting. This pre-web is reinforced to form the winter web, usually in early September, where second instar larvae overwinter. The larvae emerge in the spring at about the time of budbreak and start feeding. The larvae mature in about 8-9 weeks and pupate. The pupal stage lasts about 20 days. Adults emerge in early July and mate soon after emergence.

The browntail moth uses a wide range of deciduous trees and shrubs as host plants. The population on Cape Cod is most commonly found on beach plum, cherry, bayberry and rose. At the present time there is only very limited numbers that have been found in oak on the cape, but oak is the preferred host of the Casco Bay population.

There have been a number of attempts to manage or suppress browntail moth on Cape Cod. In 1965 and 1966 carbaryl was applied using a hydraulic mist blower in heavily infested areas (Schneider 1966). In the late 1970's and early 1980's trials were run using the biological insecticide *Bt* (McLane et al. 1978). Since these trials, emphasis has been placed on suppressing populations with ~~cultural~~ mechanical methods. In the

mid 1980's an effort was made to hand clip webs from the host plants and burn the webs. The effectiveness of clipping has been viewed as giving mixed results (Snowden 1987, Anderson 1989). At about this same time tests were also run on the effectiveness of freezing (using a carbon dioxide fire extinguisher) or flaming (using a handheld propane torch) the webs on the host plant. These methods were found to be both ineffective and costly(USDI-NPS 1987).

Along with the management methods listed above, there have been a number of biological control agents released over the years. Some have been released as a direct attempt to control browntail moth. There are also a number of "generalist" predator and parasites that have been released for control of other insects, notably the gypsy moth, that will also attack browntail moth (See Schaefer 1986 for references on biological control agents).

METHODS

To address the objectives of measuring population density and possible range expansion in future years the National Seashore was divided into three survey zones: the core infested area, a transition area, and the currently uninfested area. The boundaries of these areas were based on historical data indicating where browntail moth infestations had been found in the past and where these infestations had been sustained over time (Survey zones and plot locations are on the enclosed map). In each zone 5 permanent plot clusters were established. Each cluster was composed of a central plot and 4 adjacent plots. The adjacent plots were located in each cardinal direction approximately 50 meters from the center of the cluster. This distance was lengthened or shortened to ensure each plot was located within browntail moth host cover types which were either bayberry/beach plum/black cherry or oak. Locational data was taken at the center of each cluster using GPS. After postprocessing, this data will be input into a GIS for display and analysis. This should ensure a level of consistency in maintaining these as permanent monitoring sites.

Each plot was 0.01 hectare in size (5.7 meter radius). In each plot the number of browntail moth overwintering webs were counted. In plots where webs were present, a return visit will be made in early June to estimate defoliation. The intent is that in time it will be possible to correlate the number of webs present with the amount and severity of damage.

RESULTS

Table 1 summarizes the mean number of webs found per plot by plot cluster.

Table 1. Mean number of browntail moth webs and cover type of each plot cluster, by survey zone.

Survey Zone	Plot Cluster	Mean # of webs/subplot	Cover Type
Core infested	Herring Cove Beach #1	17	Bayberry/ beach plum
Core infested	Herring Cove Beach #2	22	Bayberry/ beach plum
Core infested	Race Point/Airport	72	Bayberry/ beach plum
Core infested	Pilgrim Lake #1	37	Bayberry/ beach plum
Core infested	Pilgrim Lake #2	1	Bayberry/ beach plum
Transition	Head of Meadows	3	Bayberry/ beach plum
Transition	Coast Guard Beach	0	Bayberry/ beach plum
Transition	Highland Light	1	Bayberry/ beach plum
Transition	Longnook Beach	0	Bear oak
Transition	North Pamet Road	0	Bayberry/ beach plum
Uninfested	Collins Road	0	White oak
Uninfested	Newcomb Hollow Beach	0	Bear oak
Uninfested	White Crest Beach	0	Bear oak
Uninfested	Marconi Site	0	Bear oak
Uninfested	Nauset High School	0	White oak

A ground check of defoliation in each of the plots containing webs will be done in early June to compare web number to level of defoliation.

CONCLUSIONS

Overall the browntail moth populations are limited to their recent historical range of infestation on the cape. The sites that had the most overwintering webs were in the dune communities of the outer cape, mostly located on beach plum and ~~black~~ cherry. Some anecdotal notes on the population include that there are numerous, large webs and that in the places where populations are concentrated, web counts

appear to be higher than last year. These observations, in combination with the fact that it was a mild winter, suggest that populations may be higher this summer than they have been in recent years in some locations. This may result in increased levels of defoliation and human contact with the insect.

RECOMMENDATIONS

1. Continue yearly monitoring of permanent plots to determine browntail moth population trends.
2. Survey of biological control agents that are present on the cape.
3. Examination of management possibilities, in case they are needed, including:
   -cultural control (clipping) in high population density areas
   -augmentative release of biological control agents including fungi, viruses, predators, or parasites, that are already present on the cape.
4. Look into ways to educate the public on the insect and what the seashore is doing.

LITERATURE CITED

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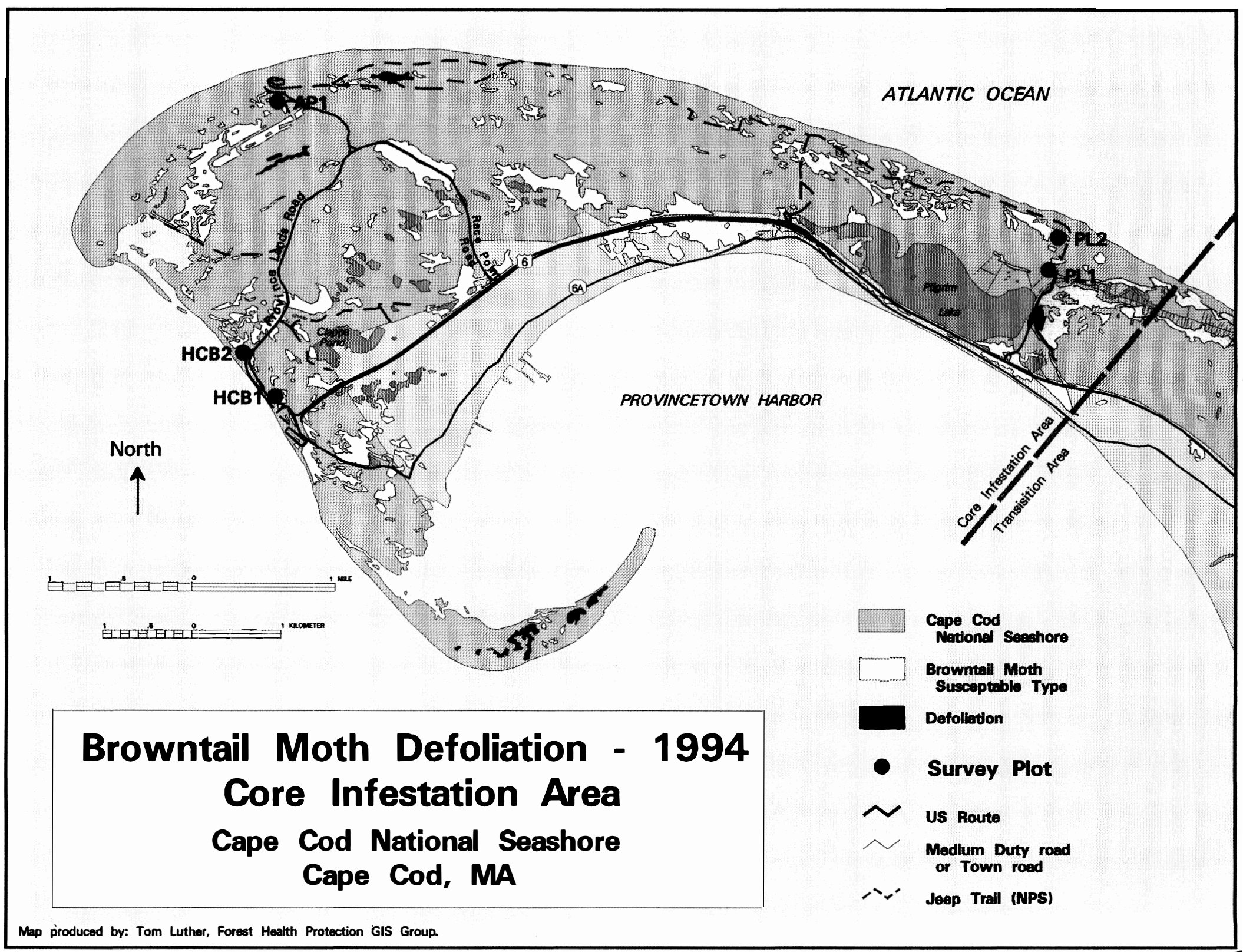

Browntail Moth Defoliation - 1994
Core Infestation Area
Cape Cod National Seashore
Cape Cod, MA

Map produced by: Tom Luther, Forest Health Protection GIS Group.